# CALFED GROUNDWATER OUTREACH PROGRAM

## SUMMARY REPORT

**September 30, 1997**

## I. INTRODUCTION

Groundwater is a crucial component of California's water supply, providing about 40 percent of the urban and agricultural water used in California. During drought years groundwater provides up to two-thirds of the water used. The total amount of groundwater stored in California's 450 basins is estimated by the California Department of Water Resources (DWR) to be 850 million acre-feet. But only about half of this water is useable, because:

- additional extraction would induce saline water intrusion
- the groundwater is already too poor in quality
- the depth to groundwater makes it uneconomical to pump to the surface
- extraction could cause subsidence.

That leaves about 425 million acre-feet of available and useable groundwater in this state. When full, California's surface water reservoirs store about 43 million acre-feet of water. Groundwater basins, therefore, store almost 10 times as much water as surface water reservoirs.

In many areas, surface water recharges groundwater basins by infiltrating through stream and river beds. In other areas, groundwater can feed river systems. Given the connection between surface water and groundwater, it is important to manage groundwater in conjunction with surface water supplies whenever possible. This form of management is known as conjunctive use -- a proven management tool that helps to increase the overall water supply while helping to protect groundwater quality.

Appropriate and effective groundwater management will be essential to the success of the CALFED Bay-Delta Program. To this end, CALFED has initiated a groundwater outreach component to help identify and address stakeholder concerns about groundwater use and management with special emphasis on conjunctive use projects. This report describes the progress to date on the outreach program, including the scope of the program, definitions of groundwater terms to help facilitate discussion of groundwater issues, draft principles for CALFED conjunctive use projects, a summary of stakeholder concerns, and preliminary mitigation strategies to address those concerns. Contact memoranda that summarize discussions held with various individuals are appended.

## II. SCOPE OF THE GROUNDWATER OUTREACH PROGRAM

Conjunctive use and groundwater banking in California have ranged from informal programs -- where a grower uses surface water when available, and then turns to groundwater during dry periods -- to more formal programs such as Semitropic Water Storage District's water banking agreement with MWD and United Water Conservation District's successful recharge and water quality improvement program, as well as other programs that have operated successfully for many years.

As part of the storage and conveyance program to protect and enhance the delta, CALFED is seeking to facilitate additional conjunctive use and groundwater banking opportunities as one way to help maximize the overall water supply and protect groundwater resources. Currently, the conjunctive use element of CALFED's program is being pursued through outreach to local communities to determine which areas would be interested in participating in a locally-controlled conjunctive use program.

So far, CALFED has contacted and met with dozens of individuals, including private citizens, water managers, water district board members, and elected officials to learn about local concerns regarding conjunctive use programs. Additionally, CALFED has participated in workshops in both the Sacramento and San Joaquin valleys to present the status of the groundwater program and to solicit additional comments and concerns regarding conjunctive use. CALFED will continue its outreach efforts during Phase 2 and Phase 3 of the Program to help ensure that local concerns regarding conjunctive use are being addressed.



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## III. DEFINITIONS OF COMMON TERMS

There has been much discussion in recent years about the terms used to describe various aspects of groundwater management in California. To facilitate a dialog among stakeholders, it is important to develop a set of definitions for those terms commonly used in the groundwater industry. Definitions proposed by CALFED and DWR are presented below:

**CONJUNCTIVE USE** -- The operation of a groundwater basin in combination with a surface water storage and conveyance system to maximize water supply. The three common forms of conjunctive use are listed below:

***Incidental Conjunctive Use*** -- Incidental conjunctive use occurs when an area relies on surface water when it is available, and on groundwater when surface water is not available. This is the basic level of conjunctive use. Management techniques may be used to define the timing and location of surface water deliveries and groundwater pumping to maximize water supply reliability.

***In-lieu Recharge*** -- In-lieu recharge brings additional surface water into an area using groundwater or both surface water and groundwater. The additional surface water is used to irrigate in lieu of groundwater, thereby allowing groundwater levels to recover. The replenished groundwater supply can then be retrieved during dry years, easing the burden on surface water supplies.

***Direct Recharge*** -- Conjunctive use programs incorporating artificial recharge methods require a source of surface water that is not needed for immediate use. The surface water is placed directly into the ground by various means, including spreading ponds and injection wells. The water stored in the aquifer is then available for use in dry years.

**GROUNDWATER OVERDRAFT** -- The intentional or inadvertent withdrawal of water from an aquifer in excess of the amount of water that recharges the basin over a period of years during which water supply conditions approximate average, which, if continued over time, could eventually cause the underground supply to be exhausted, cause subsidence, cause the water table to drop below economically feasible pumping lifts, or cause a detrimental change in water quality.



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**WATER BANKING** -- A water conservation and use optimization system whereby water is allocated for current use or stored in surface water reservoirs or in aquifers for later use. Water banking is a means of handling surplus water resources.

**WATER MARKETING** -- The selling or leasing of water rights in an open market.

**Long Term Contract** -- A long-term contract shall be for any period in excess of one year (*California Water Code Section 1735).*

**WATER TRANSFER** -- Conveyance of groundwater or surface water from one area to another that involves crossing a political or hydrologic boundary. A voluntary change in a point of diversion, place of use, or purpose of use that may involve a change in water rights.

## IV. SUMMARY OF STAKEHOLDER CONCERNS

So far, CALFED's outreach program has resulted in a greater awareness of stakeholder concerns regarding potential impacts resulting from conjunctive use programs. While these impacts are specific to each area, they essentially fall into the following categories:

- Reduced well yields
- Subsidence
- Water quality degradation
- Increased pumping costs
- Costs for lowering pumps or deepening wells
- Changes in streamflow
- Overdrafted basins
- Loss of water rights.

In addition to these potential impacts, many stakeholders have questions regarding the implementation of conjunctive use projects, such as:

- Who authorizes a conjunctive use project?
- Who controls the amount of water extracted?
- Who monitors and protects water quality?



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- How are area of origin rights, as defined in existing state and federal laws, protected?
- Who allows water to be transferred, and under what authority?
- How is conjunctive use integrated with existing management?
- How are the cumulative effects of all the projects monitored and evaluated?

CALFED recognizes that these are real concerns, many of which are based on direct experiences with conjunctive use programs that in the past were not structured to identify or mitigate for negative impacts. As a result, CALFED is currently developing guiding principles for conjunctive use programs to ensure that local concerns and potential impacts are fully addressed prior to implementing a conjunctive use operation. These preliminary principles are discussed in the following section.

## V. DRAFT PRINCIPLES FOR CONJUNCTIVE USE

CALFED has developed guiding principles that are designed to help address local concerns and potential impacts prior to implementing a conjunctive use operation. The draft principles that have been developed to date include the following:

- Funding support will be provided for local assessment of groundwater resources
- Conjunctive use programs will be voluntary
- Groundwater will first be used to meet local water needs
- Transfers outside the basin will involve appropriate compensation for the resource
- Pilot programs, in addition to computer models, will be used to evaluate local conjunctive use potential and mitigation requirements
- Conjunctive use projects will be overseen by local agencies in partnership with other entities to assure that stakeholder concerns are addressed through "interest-based negotiation"

Using these principles, a preliminary outline for implementation of a conjunctive use project would include the following steps:

- Provide funding for local assessment of groundwater resources
- Conceptualize the potential project
- Identify stakeholders
- Develop goals and objectives, including time line
- Identify a local operating entity and local partnership opportunities
- Implement a basin monitoring program



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- Conduct technical feasibility studies
- Address political, institutional and legal issues
- Identify potential impacts
- Develop a written plan, including project monitoring and mitigation measures
- Develop contract with stakeholder involvement
- Conduct pilot study and groundwater modeling program
- Fine-tune operating parameters
- Implement project
- Conduct long-term monitoring.

The CALFED Bay-Delta Program will continue to evaluate and modify its conjunctive use program with stakeholder contributions as our outreach program progresses. CALFED will look for opportunities to help communities to achieve their local and regional water supply goals through voluntary conjunctive use programs that are operated at the local level. CALFED will also continue to develop its guiding principles by working with interested agencies and individuals to address and mitigate potential impacts prior to implementing a conjunctive use program.

## VI. PRELIMINARY MITIGATION STRATEGIES

Strategies for mitigating the effects of a conjunctive use program should be aimed at detecting changes that are undesirable or unallowable and taking the appropriate steps to reduce their effects to acceptable levels or stopping the project.

Groundwater management programs, including conjunctive use projects, should monitor and evaluate the following for changes:

- groundwater levels
- land surface elevation for potential subsidence
- groundwater quality
- stream flows.

Declining groundwater levels can reduce well yields and require that wells or pumps be deepened. The conjunctive use program should develop a network of monitoring wells, a monitoring schedule and procedures for periodic evaluation of the data. Such efforts will provide the information that is necessary for determining that there is storage capacity in the aquifer for recharge, or conversely, that the aquifer is full. In addition, such measurements will show when groundwater levels reach or exceed the established thresholds as discussed below.

Extensometers can be installed to monitor vertical movement of the land surface or such movement of the land surface can be monitored by global positioning system surveying. Such data will be used to detect land subsidence.

The same wells that are used to monitor groundwater levels can often be used for water quality sampling; in some cases, additional wells may be required to effectively monitor water quality. Background levels should be established before a conjunctive use project begins. A program should then be designed to sample for appropriate mineral and chemical constituents at appropriate time intervals.

Prior to implementation of a new conjunctive use program, an adequate network of stream gages should be established on watercourses in the area. The data collected would not be immediately useful in determining what is adequate stream flow, but over the operation of the conjunctive use project the data would be used to evaluate the effect of aquifer recharge and discharge on stream flow.

Threshold values for each of these parameters should be established. For example, after the program has operated for some time, it may become clear that when groundwater levels decline to a certain threshold level, subsidence begins. Thus, when groundwater levels approach that threshold, groundwater extraction must cease. Similarly, if groundwater quality samples indicate that lower quality groundwater is flowing toward the aquifer because of the gradient established by extraction, a certain increase in specific chemical or mineral constituents would require the cessation or appropriate reduction in extraction.

The monitoring program for each conjunctive use project must be tailored to fit the requirements and thresholds established by the local agency overseeing the project. The monitoring program could be reduced in scope and intensity of no impacts are detected. The threshold values in each conjunctive use project should be reviewed periodically after evaluation of the data obtained from the monitoring program.

It is CALFED's position that conjunctive use projects should be thoroughly monitored, so that any detrimental impacts can be identified quickly, preferably during the pilot testing. Appropriate mitigation measures, ranging from reduction in pumping to cessation of the project and restoration of pre-project conditions, can then be effectively implemented by the local agency.